through double walls, to be described, of the convergent-divergent jet nozzle **25** and is returned to a valve **29** which divides the flow between a line **30** to the precombustion chamber and a line **31** to the main combustion chamber. A small portion of this fuel is tapped off ahead of valve **29** into a line **32** by which it is directed to cool the variable jet nozzle **26** and is burned. The fuel line from valve **28** to the regenerator is indicated as **33** in FIGURES 1 and 13.

The line **31** leading to the combustion chamber communicates by way of a manifold **35** with fuel nozzles **36**, and the combustion air flows from the regenerator **13** through spaces **37** between the fuel nozzles. The combustion takes place within the generally cylindrical chamber **22**. Suitable ignition means (not illustrated) may be provided. The casing of the combustion chamber **22** comprises a forward portion **39** and a rear portion **41** coupled at the bolting flange **43**. These two sections are double-walled so as to provide a cooling jacket the length of the combustion chamber. Fuel admitted through line **18** is caused to flow between the outer wall **46** and the inner wall **47** of the rear portion of the combustion chamber except for the extreme rear portion beyond a barrier **49** (FIGURE 6). After circulating in through this jacket, the fuel is transferred through a line **50** to the cooling jacket of the forward portion of the combustion chamber between the outer wall **51** and the inner wall **52** and is discharged through line **20** for further control and utilization. The extreme rear end of the combustion chamber is surrounded by a manifold **55** to which gaseous fuel is supplied through line **32** and from which it is discharged to cool the segments or flaps **26** of the combustion chamber outlet control.

Secondary air inlets

We may now proceed to a description of the secondary air inlet doors **27** shown principally on FIGURES 1 to 5. There are four of these doors which are of slightly curved generally rectangular shape. Each door is hinged to the nacelle wall **5** by a hinge connection **61** at its forward edge. The trailing or downstream edge **62** of the door can be moved between the positions shown in solid and in broken lines in FIGURES 1 and 5. A portion **63** of the nacelle wall of generally quadrantal cross section occupies each of the four gaps between the doors **27**. The doors are held in any desired position between the outer or closed inlet position and the inner or wide open inlet poritions by a pneumatic cylinder **65** and linkage **66** at each door. The open position is illustrated in solid lines in FIGURES 1 and 2 and the closed position in broken lines.

Each parallelogram linkage **66** includes links **67** pivoted on brackets **68** fixed on the outer wall **39** of the combustion chamber. Links **69** likewise pivoted on these brackets are pivoted to a head **70** on the piston rod **71** of the cylinder **65**. Links **73** parallel to links **67** and links **74** parallel to links **69** are pivoted on the head **70** and cylinder **65**, respectively, and have a common pivot axis at **75** on a bracket extending inwardly from the wall of the door **27**. As shown in FIGURE 4, the outer wall of door **27** is a double wall having an outer sheet **76**, an intermediate corrugated spacer **77**, and an inner sheet **78**, and is reinforced by flanged ribs **79** which taper towards the ends of the door. The cylinder **65** is supported by the parallelogram linkage and therefore moves in operation. The assembly includes a swivel pipe connection to the fixed structure of the regenerator case. As shown in FIGURE 3, the cylinder is double-walled and has two fluid supply connections **81** which have a swivel connection to telescoping tubes **82** which in turn are swiveled on a hollow shaft **83** mounted in a bracket **84** on the wall of regenerator **19**. The hollow shaft is plugged at its center and has fluid connections **85** and **86** at its ends which connect through lateral openings in the shaft to the interior of tubes **82**. Tubes **82** are maintained in engagement with the inlets **81** by a clamp **87**.

Variable combustion chamber outlet

The arrangement of variable flaps **26** to vary the area of the combustion chamber outlet is shown principally in FIGURES 1, 5, 6, and 7. There are eight flaps **26**, each of generally rectangular outline and arcuate cross section as seen clearly in FIGURES 5 and 7. The flaps are double-walled, having an outer sheet **91** and inner sheet **92** suitably connected as by a corrugated intermediate sheet. Brackets **93** projecting from the two forward corners of the flap are pivoted on the fixed structure of the engine. This fixed structure comprises eight intermediate wall elements **95** which have an outer wall **97**, side walls **98** converging at a 45° angle, and an inner wall **99**. Walls **97** and **99** diverge from a ring **100** at the forward edge of the intermediate members at which they are joined at the walls of the manifold **55**. The side edges of the flaps **26** slide over the side walls **98** of the intermediate members as the flaps are moved in and out. Each intermediate member bears a longitudinal sheet metal rib **101** upon which a flap actuating ring **103** is slidable. Ring **103** mounts eight brackets **105** each bearing a pin **106** which slides in a cam slot **107** of a cam **108**. The cams **108** extend radially from the outer surface of the flaps **26**. As shown clearly by the solid and broken line views in FIGURE 7, reciprocation of ring **103** moves the flaps between their wide open and minimum open position. The flaps are pivoted by pins **110** which are received in brackets **111** extending from the forward corners of the intermediate members **97**. The ring **103** is reciprocated by four fixed hydraulic cylinders **113**, spaced around the circumference of the combustion chamber, the piston rods **115** of which are connected to the rod by brackets **114**. A hoop **116** limits outward movement of flaps **26**.

As indicated by FIGURE 13, a line **32** brings gaseous fuel to the ring manifold **55** at the rear end of combustion chamber **22**. This gas is discharged through holes **117** in the wall of combustion chamber **22** so as to flow over the inner surface of the variable flaps **26**, cooling the flaps and shielding them by the reducing fuel rich gas from the hot combustion products which may contain oxygen. Means (not illustrated) may also be provided to circulate some of this gas through the fixed structure of the intermediate wall **95**.

Jet propulsion nozzle

The combustion chamber **22** and the air inlet doors **27** supply combustion products and induced nacelle boundary layer air into the convergent-divergent jet propulsion nozzle **25**. This is a metal structure through which some of the fuel on its way to the combustion chamber and the precombustion chamber is circulated to keep the nozzle sufficiently cool in spite of the hot combustion gases discharged through it. This nozzle is shown in FIGURES 1, 5, and 8 to 12. In general, it comprises an outer wall **131** which is of biconical shape with a waist at **132** which is reinforced by a circumferential strip **133**. It also comprises an inner wall **134** spaced from the outer wall and terminating short of it at **135** near the exit end of the nozzle. A circumferential ring **137** extending between the two walls is the rear boundary of a fluid outlet manifold **138** extending around the forward end of the nozzle. The interior of the nozzle is lined with axially extending tubes **141** which are cooled by fuel circulating from the exit end of the nozzle to the manifold **138**. This fuel is supplied by one or more ducts **21** into the forward end of the space **145** between the two walls through which it flows to the rear end of the nozzle and back through tubes **141**. Most of the tubes **141** terminate just ahead of wall **137** and discharge into manifold **138**. The inner wall of manifold **138** is defined by a third sheet **147** which is disposed within the forward end of the layer